

southwestern Virginia, from a storm of the southwestern type. The rains also extended over the headwaters of the South Carolina rivers, causing rapid though not alarming rises, which were repeated in a lesser degree after the Gulf storms of the 11th and 27th. The latter storm also occasioned the rise of the 29th and 30th in the north branch of the Susquehanna River, but the crests reached were several feet below the danger lines.

The danger line was reached on the 6th at Richmond, Va., and exceeded by over five feet on the 8th at Weldon, N. C. At the former place the water reached the steamship docks, necessitating the removal of a large amount of freight. Much other property along the river front was also removed to places of safety. The usual Weather Bureau warnings of the approaching flood were issued in ample time to permit this work to be done effectively and without undue haste. The Roanoke flood apparently caused no damage worthy of mention.

The rivers to the westward changed but little, although the mean stages in the Ohio were somewhat higher than during September. The suspension of through navigation between Cincinnati and Pittsburg continued, although local traffic for light draught boats was possible between intermediate points the greater portion of the month. River traffic on the Alabama River above Selma, Ala., was suspended on the 26th on account of the extremely low stage of the river, and again at Chattanooga, Tenn., on the 6th. It was resumed at the latter place on the 14th, but was again suspended on the 18th.

The highest and lowest water, mean stage, and monthly range at 143 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on

the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	30, p. m. *	47	122	5, a. m.	45	64	3,350	4.5	744	81.0
II.....	1, p. m.	51	120	9, p. m.	37	76	2,800	3.5	800	33.3
III.....	6, a. m.	49	109	11, a. m.	42	70	1,900	3.5	543	22.6
IV.....	8, a. m.	53	105	15, p. m.	35	82	1,900	3.0	633	26.4
V.....	13, a. m.	41	101	18, p. m.	46	60	1,150	2.5	460	19.2
VI.....	15, a. m.	47	101	22, a. m.	42	72	1,825	3.5	521	21.7
VII.....	17, p. m.	48	125	30, p. m.	35	76	3,400	4.5	756	31.5
	25, a. m.	45	117				2,750	5.5	500	20.8
Sums.....							19,075	80.5	4,957	206.5
Mean of 8 paths.....							2,384		620	25.8
Mean of 30.5 days.....									625	26.0
Low areas.										
I.....	2, p. m.	27	97	6, p. m.	48	68	2,350	4.0	588	24.5
II.....	10, a. m.	29	88	13, a. m.	47	54	2,300	3.0	767	32.0
III.....	10, p. m.	33	115	14, p. m.	46	60	3,150	4.0	788	32.8
IV.....	13, a. m.	54	114	15, p. m.	48	68	2,200	2.5	880	36.7
V.....	17, p. m.	37	100	19, a. m.	30	95	775	1.5	517	21.5
VI.....	21, p. m.	51	120	25, a. m.	47	65	2,700	3.5	771	32.1
VII.....	24, a. m.	41	112	26, p. m.	45	84	1,850	2.5	740	30.8
VIII.....	25, p. m.	27	83	29, p. m.	46	60	1,850	4.0	462	19.2
Sums.....							17,175	25.0	5,513	229.6
Mean of 8 paths.....							2,147		689	28.7
Mean of 25.0 days.....									687	28.6

*September.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

Alabama.—Rainfall slightly above average, being decidedly excessive in a few eastern counties; frost of last few days proved damaging over northern half of State; some cotton damaged by rain; conditions generally favorable for maturing late minor crops.—*F. P. Chaffee.*

Arizona.—The month was generally warm, with brief periods of cool weather. Except at a few stations, the weather was dry and unfavorable for fall seeding. There is very little feed on the ranges.—*M. E. Blystone.*

Arkansas.—Cloudy, damp, and rainy weather during the first week caused much cotton to rot and sprout in the bolls and greatly delayed picking. During the remainder of the month the weather was favorable for gathering crops and caused some improvement in cotton; picking and ginning progressed rapidly and cotton was marketed almost as fast as ginned. The yield of corn was generally good. Sowing of wheat progressed rapidly and considerable had come up to good stands at the close of the month.—*Eduard B. Richards.*

California.—Nearly normal weather conditions prevailed throughout the State, and the late crops were mostly under shelter before the heavy rains at the close of the month. Late grapes on the vines were considerably injured, but raisins and deciduous fruits on the trays were not materially damaged, as ample warnings were given. The first carload of oranges was shipped from Porterville on the 31st.—*Alexander G. McAdee.*

Colorado.—Conditions were exceptionally favorable to the ripening of late fruits. While precipitation on the eastern slope interfered materially with the digging of beets and late potatoes, it put the soil in fine condition for plowing and seeding. Wheat and rye, as a rule, germinated well. The yield of sugar beets is below the average; digging progressed very favorably during the latter half of the month, but at its close one-half of the crop was still in the ground.—*F. H. Brandenburg.*

Florida.—The first decade was generally favorable for harvesting cotton and corn. The second and third decades gave too much rain in some sections for vegetables on low lands. Sweet potatoes improved and the crop will be larger than expected. Oranges advanced toward maturity, and a good lot was disposed of; the fruit, however, was far from being in prime condition. The condition of citrus trees, pineapples, and vegetables is very satisfactory.—*A. J. Mitchell.*

Georgia.—Temperature averaged about normal, but much higher than

October, 1901. The rainfall was unevenly distributed, being very heavy in some southeastern counties. Light frosts in northern and middle counties on 15th and 16th; light to heavy frosts, except in extreme south on 29th and 30th. Relatively little seeding done, ground too hard and dry to plow. Cotton picking practically completed. Yields of sweet and Irish potatoes and cane excellent.—*J. B. Marbury.*

Idaho.—There were no general storms during the month. This resulted in the largest deficiency of precipitation of any October since 1895. The weather conditions were favorable for harvesting late apples and vegetable crops, but fall plowing and wheat seeding were delayed. Stock on the range suffered in consequence of short grass and drinking water, incident to the light rainfall. In many agricultural sections vegetable crops attained to full maturity before the arrival of a frost sufficiently heavy to kill.—*S. M. Blandford.*

Illinois.—The greater part of the month was warm, but on the 13th and 14th in the northern portion and on the 29th in the southern, freezing temperatures occurred. The rainfall was sufficient and well distributed in the northern and central districts, but was deficient in the southern. Corn matured rapidly and was generally being cribbed in good condition. Seeding of wheat and rye made rapid progress. Early sown wheat was making good growth, though dry conditions and the hessian fly combined to retard its growth in the southern districts. Pastures were everywhere good.—*Leon J. Guthrie.*

Indiana.—First decade of month showery, with temperature slightly below normal. Corn dried slowly, some damaged in shock. Thrashing clover delayed and some seed lost. Fall plowing and planting retarded. Balance of month temperature above normal and weather comparatively dry. Fall seeding practically completed. Wheat up to a good stand, but early planted was damaged by flies. Corn dried and cribbing commenced. Pastures good. Hog cholera prevalent in some localities; most stock in fine condition.—*W. T. Blythe.*

Iowa.—The month was favorable for farm work and drying the corn crop, except in portions of central and southern section, where rainfall was excessive. Corn gathering in progress, with more than the usual amount fit only for immediate feeding. Considerable progress in plowing. Fall pasturage extra good. Potato crop fair, and apples better than early reports indicated.—*John R. Sage.*

Kansas.—The first week was wet and cool, the rest of the month the weather was very favorable. Much wheat was sown after the 10th. Early sown wheat is up, in fine condition, good stand, and growing. Corn husking progressed rapidly, good quality and quantity. Apples gathered, crop fine. Some second growth came out for hay in south. Fall seeding of alfalfa and English blue grass successful in north.—*T. B. Jennings.*

Kentucky.—Weather was quite favorable to farming. An average acreage of wheat sown, and most of it has made good growth. Fly has attacked a few of the earliest fields. Rye and oats have made a good start. Corn gathering progressed rapidly; the yield is nearly an average one. Tobacco cured in fine condition; good color and free from wormholes; stripping has begun. Pastures in good condition and stock thriving. Good crops of late forage plants saved.—*S. P. Gresham.*

Louisiana.—General rains on 3d and 4th, accompanied by high winds, interfered with cotton picking and damaged the crop. Much cotton was blown out of the bolls and beaten into the dirt; seed sprouted in the bolls in many of the northern and central parishes. During the remainder of the month exceptionally favorable weather prevailed and picking was nearly completed at the close of the month. While the yield is better in some localities than was anticipated, and is about the average in a few sections, it is generally much below the average and in many places is not much more than half a crop. Sugar cane made satisfactory growth; grinding is progressing satisfactorily; the yield of sugar is improving under favorable weather conditions. Harvesting and thrashing of rice were about completed during the month; the yield has not been satisfactory. The bulk of the corn crop has been housed; the yield is very light.—*I. M. Cline.*

Maryland and Delaware.—Several periods of heavy rain delayed seeding and damaged some corn, fodder, and late tobacco, but prevailing mild temperatures and much open weather favored farm work at other times. Wheat nearly all sown, with good stands in early fields, but slow germination in late fields. Considerable corn cribbed; yields ordinary to good, but many ears soft. Tomato packing closed about the 20th, after a satisfactory season. Grasses grew nicely. Winter apples scarce.—*Oliver L. Fussig.*

Michigan.—The first half of the month was cool and showery, delaying the maturity of sugar beets and rotting many late potatoes. The showers also had the effect of delaying the beet harvest and the delivery of sugar beets to the factories. The last half of the month was drier, warmer, and more favorable for field work. The corn crop is small and poorly matured. Sugar beets are yielding well. Winter wheat and rye are mostly sown and germinating finely.—*C. F. Schneider.*

Minnesota.—The weather was dry early in the month and showery in the latter half. Thrashing progressed well during the dry period, though many stacks were damp. Plowing delayed by the slowness with which crops were taken from the fields, by scarcity of help, and in some southern portions by the wetness of the lowlands. Corn is in very poor condition and not much is fit for cribbing or seed. Winter wheat and rye look well.—*T. S. Outram.*

Mississippi.—The cool and wet weather of the first decade proved damaging to cotton, rotting and sprouting being prevalent in low lands; the balance of the month was favorable with the exception of frost in north portion on the 29th, which killed the top crop; late cotton matured rapidly in west and north portions, where picking continued with average yield in many counties; elsewhere picking was about completed with light yield. Minor crops were generally making from fair to good yields.—*W. S. Belden.*

Missouri.—With the exception of the first five days the month was unusually pleasant. Corn dried out well, and the damage resulting from the previous wet weather was comparatively slight, except in a few localities. Wheat sowing was completed during the middle and latter part of the month and good stands were reported, as a rule, but in the central and southern sections there was much complaint of fly in the early sown.—*A. E. Hackett.*

Montana.—The month was characterized by moderate temperature, a high percentage of sunshine and a very considerable deficiency in precipitation. At the majority of stations the monthly maximum occurred between the 2d and 7th, while the monthly minimum was most generally recorded during the last decade of the month. At a large number of stations the amount of precipitation recorded was the least for any October since the commencement of observations. Considerable fall plowing done.—*Montrose W. Hayes.*

Nebraska.—The heavy rains the first half of the month greatly retarded farm work and caused some damage to crops in field and stack. Thrashing progressed rapidly the last half of the month. Wheat seeding was delayed by the wet weather, and most of the seed was placed in the ground later than usual, a large amount being sown the last two weeks of October. Early sown wheat came up well and is growing finely. Corn dried out slowly and generally very little husking was done until the last days of the month.—*G. A. Loveland.*

Nevada.—The weather of the month was remarkably pleasant, there being an average of twenty clear days. The conditions were very favorable to harvest operations and farm work generally. Crops harvested in excellent condition; little or no damage from frost.—*J. H. Smith.*

New England.—The weather of the month was favorable to farm opera-

tions, harvesting crops, and to seeding and germination of seeds. The temperature was generally above normal and the precipitation decidedly above the average. Severe local storms occurred in Vermont on the 18th, with thunderstorms, hail, and high winds. The first general killing frost, one to reach all sections, occurred on the 22d, but caused little damage, as crops had been secured.—*J. W. Smith.*

New Jersey.—The weather conditions were unfavorable for farming operations during the first half of the month; frequent heavy rains prevented seeding of wheat and rye; latter half more favorable, seeding completed; early sown has obtained a good stand and the late sown coming up evenly; corn nearly all husked, yield good in central and southern but only fair in northern sections; pastures excellent. First killing frost occurred on the 22d; late crops all housed before that date.—*Edward W. McGann.*

New Mexico.—Warm, clear, and dry month. Absence of general killing frosts permitted grass on the ranges to cure exceptionally well, but on northern ranges there was little to cure. Number of stock greatly reduced on northern ranges for the winter owing to scarcity of feed.—*R. M. Hardinge.*

New York.—The weather during October was generally favorable for farm work and for wheat and rye, which were in good condition at the close of month, the early sown being excellent and the late good, but not so well advanced. Pastures and fall feed were good, but corn, beans, potatoes, apples, and grapes were much below the average, both as to quantity and quality, but all crops were harvested without material damage by frosts.—*R. G. Allen.*

North Carolina.—Conditions during the month were very favorable for farm work. Gathering crops was well advanced. Tobacco was all cut and safely housed. Corn, peanuts, rice, and hay were harvested. Plowing and seeding winter grains made rapid progress. Early sown winter wheat and oats came up to good stands and were thrifty and vigorous at the close of the month. Cotton continued to develop and the yield was increased until stopped by heavy frost on 30th. Picking was finished, except in scattered localities.—*C. F. von Herrmann.*

North Dakota.—The weather during the month was generally favorable for farm work, although thrashing and fall plowing were all that remained to be done. Thrashing was occasionally interrupted by light rains, which were not heavy enough, as a rule, to wet the ground sufficiently to make fall plowing easy, except in a few favored sections in the Red River Valley.—*B. H. Bronson.*

Ohio.—Corn, tobacco, and clover seed damaged by wet weather during first of month. There is considerable soft corn. Tobacco curing well. Wheat seeding well advanced; germinating well; stand generally good; fly is reported in some central and western counties. Pasture and grass fields good. Potato crop good. Apples yielding better than expected in north and east.—*J. Warren Smith.*

Oklahoma and Indian Territories.—Fair weather, excess in temperature, and scattered showers favored progress of farm work and growth of cereals in the ground. Late wheat was planted and came up to a good stand; early sown wheat was high enough to pasture. Cotton opened and gave larger yields than was expected, while the fibre and quality were good. Corn husking gave fair to good yields. June corn, late potatoes, and turnips made good growth. Grass, pastures, and stock were in good condition. Fruit trees were in good condition for winter.—*Chas. A. Hyle.*

Oregon.—There was not rain enough until the last decade of the month to soften the soil for fall plowing and seeding, and, consequently, this work was started later than usual. Early sown grain or summer fallowed land germinated slowly, and at the end of the month the fields were spotted and uneven in most places. Some few sections report a poor crop of winter apples, but, taking the State as a whole, the crop promises to be very satisfactory.—*Edward A. Beale.*

Pennsylvania.—Heavy precipitation damaged corn and buckwheat in many sections and retarded husking, thrashing, and late seeding. Early sown wheat and rye made favorable advancement. Corn, potatoes, and buckwheat gave satisfactory returns generally, but complaints of corn failing to mature and potatoes rotting were numerous. The apple crop was better than early conditions and continued unfavorable weather gave reason to expect.—*T. F. Townsend.*

Porto Rico.—Rainfall was insufficient for all agricultural interests excepting that of coffee. Cultivation of young crops and the preparation of lands for new crops have been carried on under considerable difficulty because of the dry condition of the ground. Coffee berries began to mature very rapidly early in the month and the growers have been greatly taxed to gather them as fast as they ripened. Fortunately the crop has been pretty well saved with but little loss. Young canes have maintained a good color but have not made the usual advancement. Old canes have arrowed quite freely. Tobacco interests are in a highly satisfactory condition; large amount of seed has been sown, which has germinated rapidly, the young plants are fast becoming established, and the lands are well prepared for the young plants. Markets were well supplied with small crops, ground provisions, vegetables, and fruits of the season.—*E. C. Thompson.*

South Carolina.—Although the precipitation was in excess of the normal, it was so well distributed throughout the month that opportunity was given for gathering corn and cotton, making hay, and finishing rice

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest

and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings:

Summary of temperature and precipitation by sections, October, 1902.

Section.	Temperature—in degrees Fahrenheit.						Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.				Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.	Station.	Amount.	Station.	Amount.
Alabama	63.4	-0.4	Pushmataha	95	3	Hamilton	26	29	Union Springs	8.65	Riverton	1.39
Arizona	67.4	+1.8	Aztec	101	15	Flagstaff	21	3, 5, 29	Tucson	1.64	17 stations	0.00
Arkansas	62.5	-0.2	Arkadelphia	90	9	Pond	29	28	New Gascony	7.10	Mount Nebo	0.88
California	60.7	-0.3	Rison	26	26	Pocahontas	29	29				
Colorado	48.5	+1.1	Ogilby	104	6	Bodie	-6	25	Fort Ross	8.95	11 stations	0.00
Florida	74.2	+1.0	Bialue	90	21	Russell	0	4, 15	Ruby	2.57	Montrose	0.10
Georgia	64.4	+0.7	Cheyenne Wells	22	22							
Idaho	49.2	+1.6	Bartow	96	1	Wausau	33	30	Hypoluxo	18.99	Holt	0.98
Illinois	57.0	+1.9	Fitzgerald	92	2	Clayton, Tallapoosa	28	29	Valona	14.27	Lost Mountain	0.92
Indiana	56.7	+1.3	Millen	91	3							
Iowa	53.5	+3.3	Silver City	91	18	Forney	12	30	Silver City	1.44	Downey	0.01
Kansas	58.8	+2.1	Centralia	93	9	Tiskilwa	23	14	Cambridge	4.19	Mount Vernon	0.28
Kentucky	60.1	+1.2	Madison	89	9	Hallidayboro	24	29	Fort Wayne	4.28	Elkhart	0.70
Louisiana	67.3	-0.4	Ida Grove	83	10	La Fayette	20	14	Newton	6.66	Sioux Center	0.28
Maryland and Delaware	57.3	+1.7	Council Bluffs	22	22	Plover	20	14	Hanover	4.00	Independence	0.82
Michigan	48.3	-0.9	Hutchinson	94	23	Wallace	20	27				
Minnesota	47.1	+0.5	Williamsburg	91	9	Achilles	25	28	Earlington	3.74	Fords Ferry	T.
Mississippi	64.4	0.0	Alexandria	93	7	3 stations	25	29	Port Eads	9.11	Wallace	0.99
Missouri	59.4	+2.1	Boetherville, Md.	89	25	N. La. Ex. Station	34	29	Bachmans Val., Md.	10.72	Pocomoke City, Md.	2.05
Montana	46.6	+1.7	Wasepi	81	24	Deerpark, Md.	17	30	Hagar	6.19	Ludington	0.30
Nebraska	53.6	+2.9	Currie	80	24	Ewen	10	9	Pine River Dam	5.85	Worthington	0.14
Nevada	49.8	+0.8	Jackson	91	2	Angus	11	13	Bay St. Louis	7.65	Water Valley	T.
New England	49.4	+1.3				Pittsboro	28	29				
New Jersey	56.0	+2.1				Duck Hill	30	30	Oregon	4.72	Jackson	0.87
New Mexico	53.5	+0.8				Potosi	23	29	Fort Logan	0.90	4 stations	T.
New York	49.1	+0.3				Boulder	14	30	Bradshaw	5.15	Hartington	T.
North Carolina	61.3	+1.5				Lynch	14	28				
North Dakota	43.7	+1.7				Monitor Mill	13	31	Lewers Ranch	1.71	6 stations	0.00
Ohio	54.6	+1.8				Rutland, Me.	14	24	Rutland, Mass.	8.67	Cornwall, Vt.	2.64
Oklahoma and Indian Territories	62.9	-0.1				Layton	20	22	Hightstown	9.35	Cape May City	3.82
Oregon	58.2	+1.6				Winsors	15	27	Fort Stanton	1.81	Galistoe, Raton	0.00
Pennsylvania	53.1	+0.9				Indian Lake	12	18	Setauket	7.32	South Canistoe	1.49
Porto Rico	78.2	-0.6										
South Carolina	63.2	-0.8										
South Dakota	49.9	+1.8										
Tennessee	60.3	+1.1										
Texas	68.1	0.0										
Utah	50.0	+1.0										
Virginia	58.8	+0.8										
Washington	52.4	+1.8										
West Virginia	56.5	+1.6										
Wisconsin	49.5	+0.8										
Wyoming	45.8	+1.0										

harvest. The frosts were generally light and damaged the most tender vegetation only. Lands were prepared and much oats sown as well as some wheat; the stand of oats is good. Sweet potatoes and peas gave fine yields.—*J. W. Bauer.*

South Dakota.—The weather was generally favorable for field operations, for drying outstanding corn, and for the germination and healthy growth of winter rye. Plowing was in some localities retarded by insufficient moisture. Corn pulling advanced fairly well, but as a result of September frosts, there was considerable still too soft for cribbing, some was spoiling, and the marketable proportion was less than indicated September 30. Thrashing of grain and potato digging were practically completed.—*S. W. Glenn.*

Tennessee.—There were light rains at intervals, with heavy frosts about the middle of the month. Work progressed rapidly and favorably, except during rains on the 3d and 11th; wheat land was mostly seeded under favorable conditions, early wheat being thrifty and seeding showing good stands; cotton much injured by rains, the crop mostly gathered and below average; late corn developed better than expected; late tobacco made fine growth, crop all housed; at the close of the month fall work was well advanced.—*H. C. Bate.*

Texas.—General rains during the month of September and the early part of the current month placed the soil in excellent condition for plant growth and the seeding of grain. Thermal conditions were unusually favorable for maturing and gathering crops and there was an entire absence, except in the extreme western portion, of frosts injurious to vegetation. Cotton picking progressed very favorable during the month

and at its close picking was completed, except in fields of late cotton and in sections where the top crop was opening. Some complaint was made of cotton not opening satisfactorily because of dense foliage and excess of sap in the bolls. Considerable damage to rice was done by the heavy rains of September and the early part of October. The seeding of wheat, rye, oats, and barley made very satisfactory progress and these crops at the close of the month were generally up to fine stands and growing nicely. Preparations for fall and winter vegetables well advanced.—*Edward H. Bowie.*

Utah.—The ground was generally too dry for plowing and very little of this was done. The dry, mild weather was very favorable for other kinds of farm work. Potatoes were harvested, but sugar-beet digging was still in progress at the close of the month. The ranges are in very poor condition in all parts of the State and stock will suffer from shortage of feed during the coming winter.—*L. H. Murdock.*

Virginia.—The month was generally favorable for fall work. The seeding of winter wheat and oats was practically completed and of that sown early many fields came up to good stands. Fall grass did nicely and late pastures afforded excellent grazing. The work of cutting and housing tobacco was completed early in the month and the gathering of corn was finished by its close. Plowing and other soil preparations for late seeding are about done.—*Edward A. Evans.*

Washington.—A warm and unusually dry month. The first half of the month was very favorable for plowing and sowing fall wheat, owing to the copious rains during last week of September. The last three weeks

were too dry for germination of wheat in the drier parts of the eastern counties.—*G. N. Salisbury.*

West Virginia.—Fall plowing was rapidly pushed during the first week and seeding was mostly done. Wheat, rye, and oats germinated quickly under the warm sunshine, and were looking green and thrifty at the close of the month. Later sown grain did not germinate so well for lack of moisture. Corn hardened nicely and some was husked. Cabbages and turnips turned out better than expected. Pastures were short, but stock was in good condition; apples were mostly picked, but the yield was light and of inferior quality.—*E. C. Vose.*

Wisconsin.—The month was slightly warmer than usual and favorable

for the completion of fall work. Corn was secured early in the month in the southeastern counties and along the lake shore, where there was little damage from the early September frosts. Winter wheat and rye attained a good stand and is generally reported in excellent condition. Fall pasturage was very good throughout the month.—*W. M. Wilson.*

Wyoming.—The month was pleasant throughout the State, and favorable to the stock. No extremely cold weather or heavy snowfall was reported from any section of the State. In a few sections water for stock became scarce, owing to the absence of rain or snow; owing to lack of snow some stock could not be moved to the winter ranges.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

CLOUDBURSTS.

By A. D. ELMER, Voluntary Observer, Northfield, Mass.

I have seen the tracks of several so-called cloudbursts in New England and have also seen some of the storms themselves at a distance. Observers who happen to be in close proximity can determine whether these storms differ from thunderstorms except as to direction and velocity of motion. The cyclonic thunderstorm passes over the observer slantingly. If it moves broadside it passes over the observer quickly, with a tornado of wind; this is rare. Conversely, if it moves lengthwise, then it may last at one point until the whole length of the disturbance has passed over; in this case the observer experiences a calm with heavy rain. When the thundercloud moves transversely to the line of action it moves rapidly and, therefore, its short rainfall covers a wide area. In proportion as it moves more obliquely it is less squally, the area of precipitation is narrower, and the total amount heavier. If it moves along on the line of its greatest axis, the path of precipitation must be very narrow and the total amount very heavy; the most excessive amounts, of course, make the line of heaviest condensation. Therefore, such a local storm is capable of depositing as much water along a narrow track as a storm moving sidewise would do over a much wider area. The prevailing tendency of storms is to move in a median direction; those moving lengthwise are as rare as those moving broadside on. The latter, as described by Hinrichs, in Iowa, have a local name (*derecho*). The fact that they move along their short axis accounts for their covering a wide area, and for their being observed by many. The local storm that moves lengthwise being both infrequent and felt over a narrow area, is, of course, very rarely recorded. Its amount of precipitation may be still further increased at any given point by another characteristic. As above stated, the side-moving squall has the greatest velocity, the oblique-moving thunderstorm has less, and the disturbance which moves lengthwise sometimes seems to drag along. Let us consider the effect of this slow progress on an Indian file of pouring rain clouds when lifted in its march over a hill or mountain range. I have seen two such; one was climbing over the Northfield Mountains rising about 1,400 feet from the Connecticut River Valley; the other was passing up over the Hoosac Mountains, in Adams County, and rising about 2,500 feet from the valley of the Hoosac River. In such cases we have a continuous rain for hours along one line and which may amount to $\frac{1}{2}$ inch in five minutes, or 6 inches in one hour. If the storm line is 60 miles long and moves 20 miles per hour, 18 inches may fall in the three hours it occupies in marching over. Such being possible on the windward side of a mountain, at valley stations in New England thunderstorms, where the rate of fall occasionally equals 6 inches per hour, how long would it take a valley brook starting in the mountains to increase into a destructive body of water? It is probable that many of these storms are discontinuous, coming in series of showers. The one observed by me on the Northfield Mountains was at times so narrow that I could look under it and through the rain wall to distant Mount Toby; it lasted much of the afternoon and the brooks washed

out every culvert on the railroad for several miles. The storm in Adams County and that of June, 1902, at Middlesex, Vt., and northeast of that place were more destructive. Davis's Report on the New England Thunderstorms, 1885, furnishes good illustrations of storms which move broadside on (see July 21) and of the ordinary but severe thunderstorms (see July 9). I have not mentioned the occasional advance of an isolated thundershower, which being practically a point, has no breadth; but hope I have made it clear that the long thunderstorm cloud, advancing along its long axis may be directly responsible for all so-called cloudbursts.

DOES THE LIGHTNING EVER STRIKE THE OCEAN.

By Prof. JOHN TROWBRIDGE.

Prof. John Trowbridge, Cambridge, Mass., calls attention to the fact that—

Low lying clouds heavily charged may possibly sometimes discharge electrically to the surface of a large body of water like the sea; but he believes that his experiments show that at the average altitude of thunder clouds the tendency is to discharge from one region of cloud to another in preference to discharging to the sea. The testimony of persons who claim to have seen lightning strike the sea is not very reliable, since most persons are ignorant of the phenomena of irradiation, they are confused by the blinding flash and mistake reflection in the water for the flash itself.

He adds:

By means of a battery of 20,000 small cells a voltage of about 6,000,000 is obtained, which is at least comparable to that of lightning. With this large battery, I was able to obtain an electric spark about 7 feet long and found that instead of striking the water a spark of 6 or 7 feet in length invariably jumped to some adjacent object in preference to striking the liquid surface. A spark of only a few inches in length, however, will strike the water, but such a spark is not comparable to lightning.

Beyond a million volts the initial resistance of atmospheric air to electrical discharges becomes less, and the discharges, therefore, are shunted through the air instead of upon the water, and strike some object adjacent to the water.

THE CLIMATE OF BAGUIO, PHILIPPINE ISLANDS.

By FRANK O. STETSON, United States Weather Bureau.

Rev. Jose Algué, the Director of the Philippine Weather Bureau, has published an interesting study of the weather at Baguio, the first of a series of reports "On the climatological conditions of certain regions of the archipelago which might be advantageously chosen as health resorts." Baguio, on the island of Luzon, about 140 miles north of Manila and some 18 miles from the western coast, occupies a plateau 4,777 feet above sea level. The observations, which are taken ten times daily, are given in extenso for pressure, humidity, cloudiness, precipitation, fog, and wind direction. The record covers only a period of twelve months, but this will perhaps suffice for a general idea of the climate of a locality within 17° of the equator. The claims of Baguio as a health resort rest chiefly, if not entirely, upon its temperature. This, as the latitude and elevation would indicate, is delightfully mild and equable. During the period under examination it varied from a minimum of 47° in February, the coldest month of the year, to a maximum of 84° in April, which is the hottest month. The extremes at Key West, Fla., during the same period were 89° and 51° .